

V.

LOWER COCOLALLA CREEK
(tributary to Pend Oreille River)

Waterbody Type: stream
Ecoregion: Northern Rockies
Designated Uses: domestic and agricultural water supply, cold water biota, primary and secondary contact recreation and Special Resource Water.
Size of Waterbody: 7.3 miles stream; 376 acres water
Size of Watershed: 16,234 acres

Summary:

The Lower Cocolalla Creek was listed in 1996 as water quality impaired due to sediment and thermal modification. This problem assessment concluded that the stream is impaired due to excess sediment. Sediment load target was set at 1,202.5 tons/yr from the existing load of 4,685.7 tons/yr. Temperature will not be addressed at this time pending an anticipated change to this standard.

1. Physical and Biological Characteristics

Lower Cocolalla Creek is the singular outlet flowing out of Cocolalla Lake at the northwest corner. The stream receives some drainage from the northwest tip of the watershed, which does not enter the lake. Cocolalla Creek enters Round Lake about 3 stream miles from Cocolalla Lake. The outlet of Round Lake, still called Cocolalla Creek, flows about 3.5 miles east where it enters the Pend Oreille River.

The watershed, which drains into Cocolalla Lake and ultimately into the outlet stream, has been outlined and measured in different sources to be between 55 to 64 square miles. The watershed is heavily forested with foothill and mountainous terrain up to 4500 ft elevation and slopes ranging from 15-50%. There has been considerable logging activity and most timbered areas are second growth. There are also flatland valleys with commercial and hobby grazing and cropping of hay.

Land cover types in the Lower Cocolalla Creek watershed from the outlet to Round Lake are primarily forest, with open forest types dominating 58% of the watershed and dense forest accounting for 36%. The total acreage of this subwatershed is 1,032 acres, which makes up only 2.8% of the total Cocolalla Lake watershed. Roads make up 2.7% of the outlet watershed and agriculture/grazing account for 3% of the total acreage from the outlet to Round Lake (Rothrock 1995).

Geology. The bedrock consists mainly of the Selkirk Crest quartz monzonite (Tertiary) and metamorphic rocks (Precambrian). The valleys are filled with sediments from current erosion of the mountains, lake deposits, glacial till, and outwash. Cocolalla Lake is bordered by batholith

granites near the Black Pine Mountain.

Soils. There are three general soil map units that are common throughout the watershed. In the foothills and mountains the general soil unit is Pend Oreille-Rock outcrop-Treble on 5-65% slopes with very deep and well-detailed soil units. In general these soils are classified as moderate to very deep and well drained. They were formed in glacial till derived from granite, gneiss, and schist and have a mantle of volcanic ash and loess. Permeability is rated moderate, runoff rapid to very rapid, and the hazard of water erosion high to very high. This unit is considered poorly suited to roads, dwellings, and recreational development because of slope, a hazard of erosion, and the areas of Rock outcrop.

Also common is the Bonner-Kootenai soil unit. This is a very deep, well-drained soil found in the flatlands and terraces of 0-4% slope. It formed in glacial outwash derived from granite, gneiss, and schist and has a mantle of volcanic ash and loess. Runoff is slow and the hazard of water erosion slight. This unit is suited to hay, pasture and livestock grazing.

The third unit is intermixed in the flatlands with the Bonner soil and is known as the Hoodoo-Pywell-Wrencoe unit. The most common detailed unit is Hoodoo silt loam, a very deep, poorly drained soil on 0-1% slopes. It formed in alluvium derived mainly from volcanic ash. Runoff is very slow and the soil is subject to very long periods of flooding late in winter and spring. The soil is well suited for hay, pasture, and livestock grazing. A second detailed unit is the Pywell-Hoodoo complex with the Pywell soil formed in organic material derived predominantly from herbaceous plants. The soil is poorly drained and subject to long periods of standing water.

Groundwater Hydrology. Cocolalla Lake and portions of the south, east, and north watershed overlie the Southside Aquifer, which covers approximately 46 sq mi (Rothrock 1995). In an analysis of static water levels from 127 well logs within the aquifer, depth to ground water varied from zero to 250 ft with an average depth of 51ft. Ground water movement of the aquifer was found to be north from the town of Granite through the Cocolalla Valley toward the south end of Cocolalla Lake, and continuing north from the lake toward the Pend Oreille River. The water level profile around Cocolalla Lake was found to have a relatively flat gradient.

Land ownership.

Table 1. Land Ownership - Lower Cocolalla Creek

<u>Ownership</u>	<u>Acres</u>
Private	12,873
Federal, State	3379
Water	376
Total	16,628

Land Use.

Table 2. Land Use - Lower Cocolalla Creek

<u>Land Use</u>	<u>Acres</u>
Forest Land	5,547
Pasture & Hayland	10,705
Water	376
Total	16,628

Population and Economic Conditions. There is an estimated year-around population of 1,400 residents in the watershed. More than 450,000 people live within a two hour drive of Cocolalla Lake and the area within this driving range is experiencing dramatic population growth.

The Cocolalla Lake Watershed is rural, consisting of numerous 5 to 20 acre residential properties, many with hobby farms. There is no industrial activity in the watershed.

2. Pollutant Source Inventory

Point Source Discharges

There are no known point source pollution discharges to Lower Cocolalla Creek or its tributaries.

Nonpoint Source Discharges

Many non-point sources of pollution were identified and noted in the Final Report of the Cocolalla Creek Local Working Committee as prepared by Clark (1991) and in the Cocolalla Lake Watershed Management Plan prepared by Gilmore (1996). Although not specific to Lower Cocolalla Creek, these sources for the entire Cocolalla Lake watershed were:

Silviculture. There are approximately 14,130 acres of forestland within the Cocolalla Creek watershed. Much of this watershed is covered with densely forested areas, consisting of conifers including Douglas fir, grand fir, ponderosa pine, and lodgepole pine. A significant portion is covered with open forestland that has been selectively logged. Logging clear-cuts in the watershed comprise only about 1 percent of the area (Gilmore 1995). Some large blocks of forested land are managed by the U.S. Forest Service, Panhandle National Forest. Other public lands are managed by the U.S. Bureau of Land Management and the Idaho Department of Lands. Most of the land is under private ownership, with some owned by corporations.

Harvest activity occurred throughout the watershed at a brisk rate in the early 1990's. In 1994, the Idaho Department of Lands office in Sandpoint, Idaho issued 148 Certificates of Compliance-Fire Management Agreement/Notification of Forest Practice within the Cocolalla Lake watershed (Gilmore 1995).

Erosion on forest land typically occurs only during harvest activities and is associated mainly

with improper road and skid trail design and construction. Forest harvest activities within the riparian area can damage the stream if tractor or skidding activities occur across the creek channel. Excessive organic debris can contribute to nutrient loadings, and skid trails through the creek may result in a direct channelization of water from the uplands to the creek during the following spring run-off events. Silvicultural activities are the only nonpoint source activities that are currently subject to regulations protecting water quality in the Cocolalla Creek watershed.

Agriculture and Grazing.

Pasture condition rated on forage quality, grazing management levels, soil condition, and erosion potential estimates approximately 80% of the pastures are in good condition, 10% in fair condition, and 10% in poor condition (Gilmore 1995).

Stream zones associated with grazing were rated according to the quality of riparian vegetation, streambank stability, and streambank erosion potential. Estimates indicate approximately 80% of the streambanks are in good condition, 10% in fair condition, and 10% in poor condition (Blew 1995).

Cocolalla creek flows from forest land through hay and pastureland. Many of the channels have been physically altered or straightened. This has impacted the hydrology of the system by changing the timing and volume of stream flows. Riparian vegetation on the straightened sections is in poor condition, with the woody component completely lacking or decadent. This increases the potential for channel erosion during spring runoff flows. This also increases the vulnerability and erosion potential of the banks when exposed to mechanical impacts from livestock.

Sediment from sheet and rill erosion on the pasture and hayland is insignificant, since most fields are flat 0-3% slopes, and have 70-95% vegetative cover.

Roads. An estimated 2% of the watershed acres are included as roadways. This does not include the miles of active and inactive forest roads. When inactive roads are factored in, road densities in the watershed exceed 5 to 6 miles per section, which can significantly affect the drainage patterns and overall hydrology of the system, including sediment transport (Gilmore 1995).

Sediment is generated by roads because drainage facilities and other sediment control measures have not been implemented in many areas. The roads generally have shallow side ditches but very few relief or cross culverts. As the runoff water drains from the road surface, it is collected in the roadside ditches and then continues to grow in terms of flow, velocity, and sediment transport. The discharge points for most of these ditches are directly to the stream.

Road surfaces are often observed to encourage rill and gully erosion. Cut slopes are often steep and have little chance for revegetation, leaving exposed soil surfaces. Fill slopes also are often

too steep to become revegetated and they continue to contribute sediments to down slope areas or directly into the streams (Gilmore 1995).

Unsurfaced roads contribute sediment at a greatly accelerated rate. The roads which have the greatest impact are associated with those near the stream and improperly maintained or abandoned logging roads in the forested areas. Erosion rates have been estimated as high as 7 tons per acre/year for road surfaces and side slopes.

Residential development (urban wildland interface). The Cocolalla Creek watershed is experiencing tremendous development. An estimated 300 acres per year are subdivided with the majority of the development occurring on 20 acre parcels following forest land harvest activities. Erosion control practices, installed on the forest land under the Forest Practice Act, are destroyed and removed during construction. Opportunities for erosion increases as contractors and developers excavate for home sites and driveways during the critical erosion periods. Rural land divisions creating parcels 20 acres or larger are currently exempt from the county subdivision ordinance. There is a lack of enforcement on these larger developments and contractors and developers are generally not planning or implementing erosion control or storm water management plans. Erosion control plans or storm water management plans for residential construction are required as a condition of building permit issuance by Bonner county, but lack enforcement.

2a. Summary of Past and Present Pollution Control Efforts

In 1990, Upper and Lower Cocolalla Creeks and Cocolalla Lake were designated as Stream Segments of Concern under the Idaho Antidegradation Program. A Local Working Committee was formed which developed water quality objectives and site specific Best Management Practices for these areas (USDA-SCS 1992).

In September 1992, a grant application was made for EPA Phase II funding for Fiscal Year 1993 to install several site specific phosphorus reduction demonstration projects.

The Cocolalla Lake Clean Lakes Phase I Diagnostic report was completed in 1995. This report, coupled with the feasibility analysis completed by the Montgomery Engineering firm, were used as the basis for the comprehensive Cocolalla Lake Watershed Management Plan published by the Bonner Soil Conservation District in June 1996. This management plan sets out 5 targets, or project goals, to minimize further degradation and improve water quality in the Cocolalla Creek watershed (these are narrative, not numeric, goals). These goals address the reduction of pollution from specific nonpoint sources within the watershed. The plan includes a cost analysis of implementation and addresses sources of potential funding.

3. Water Quality Concerns and Status

Designated beneficial uses of Lower Cocolalla Creek are domestic and agricultural water supply,

primary and secondary contact recreation, cold water biota, and Special Resource Water. As a Special Resource Water the stream has been found to require intensive protection to preserve outstanding characteristics or to maintain current beneficial uses. In 1994 the creek was identified as impaired for sediment and thermal pollution.

3a. Applicable Water Quality Standards

Lower Cocolalla Creek was listed for sediment and thermal pollution in the 1996 303(d) list. The Idaho Water Quality Standards narrative criteria (IDAPA16.01.02.200) states that sediment shall not exceed, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Such impairment is determined through water quality monitoring. Monitoring conducted in 1991 showed that sediment was limiting beneficial use attainment (Rothrock 1995).

The numeric criteria (IDAPA 16.01.02.250) for temperature to protect cold water biota, must be 22°C or less with a maximum daily average of no greater than 19°C. Temperature exceedances will not be addressed until proposed new temperature standards have been finalized.

3b. Summary and Analysis of Existing Water Quality Data

In August 1990, DEQ received a U.S. Environmental Protection Agency (EPA) Clean Lakes Phase I grant. A diagnostic monitoring program was conducted by DEQ from October 1990 to September 1992. A summary and analysis of that monitoring and other data collected from the Beneficial Use Reconnaissance Project are presented here.

Flow. An account of monthly average discharge and flow volume was collected from October 1991 through September 1991. This data was collected at the Lake Outlet (Lower Cocolalla Creek) and several stations on tributary streams above the lake. Data at the outlet can be summarized as: 1) mean discharge (cfs) - 58.2; 2) maximum discharge (cfs) - 377; 3) total flow volume (acre-feet) - 42,127. This station exhibited peaks in its continuous hydrograph representing three short duration high flow peaks (3 to 7 days) between late winter and spring, coinciding with similar peaks on main tributary streams (Upper Cocolalla and Fish Creeks). The highest peak was in early April with discharge approaching 380 cfs. Monthly volume was at its greatest in April, 11,000 acre-feet (Rothrock 1995).

Phosphorus. On Lower Cocolalla Creek, extreme total phosphorus peaks were absent but the February 20th sample of 0.028mg/L was the highest of the study year, coinciding with similar seasonally high concentrations from Cocolalla Lake tributary streams. The seasonal average was 0.018 mg/L total phosphorus compared to the combined flow weighted mean from the five inflow tributary stations of 0.034 mg/L. This would indicate a high phosphorus retention within the lake. The majority of dissolved orthophosphate values at this station were below the detection level of <0.002mg/L (Rothrock 1995).

Physical Characteristics. Lower Cocolalla Creek, due to its source being the lake, August

temperatures reached 22° C. Hobo temperature graphs from 1997 showed similar high temperatures in July and August. In early August 1991, dissolved oxygen had dropped to 4.6 mg/L.

BURP Data. In 1995 BURP data taken at a sight approximately 100 meters downstream from Round Lake recorded a temperature of 24°C on July 31. A current meter discharge measurement recorded a flow value of 3.42 cfs. A Wolmann pebble count at the site reported 13.37% fine particles (<6mm diameter). The Macroinvertebrate Index (MBI) was recorded at 2.99, which requires verification for support status.

Fish. A July 1987 survey of Cocolalla Creek by the Idaho Department of Fish and Game found brown trout, rainbow trout, brook trout, and largemouth bass. Rainbow trout and brown trout were generally distributed upstream from Cocolalla Lake. Brook trout, the most numerous of the three salmonid species, was distributed both upstream and downstream of the lake. Largemouth bass were only sighted near the confluence with the Pend Oreille River (Rothrock 1995).

Summary. The data presented here would tend to suggest that this stream segment, while listed for the same factors as the upper segment above Cocolalla Lake, has inherently different and unique characteristics. This is due to the effects wrought by the lake. Nutrient and sediment loads are relieved somewhat by the absorption of these pollutants by the biological and physical characteristics of the lake. Tributary sediment loads are dropped into the lake, and consequent uptake of nutrients by biological organisms and the settling of sediments reduce outgoing concentrations.

Meanwhile, the effects of pollutants such as elevated temperature and low dissolved oxygen values are magnified. Water flowing out of the lake has been subject to irradiation and is much warmer than tributary inflow. Dissolved oxygen values reflect the extremely low values typically found in mesotrophic-eutrophic lakes such as Cocolalla.

3c. Data Gaps for Determination of Support Status

Although there is a significant amount of temperature data on current conditions that has been obtained from monitoring done by the IDEQ since 1991, further investigation is needed concerning the watershed's natural and background temperature regime and biological support status. Data results show that late summer temperatures regularly exceed water quality criteria of temperature for full support of cold water biota and salmonid life cycles. There is no readily available information, however, on historical or background temperature regimes within the stream outlet or its source, Cocolalla Lake. Collections in the mid-1970's show that Cocolalla Lake was already mesotrophic to eutrophic, which would indicate high summer water temperatures entering the outlet stream at that time.

More in depth analysis of BURP surface fines data and additional sampling of surface fines would be valuable to confidently establish a suitable sediment target for this stream. The current

listing of this segment for sediment seems to be based upon data collected on reaches above Cocolalla Lake. The BURP data on the lower segment below Round Lake indicates a low percentage of fines. There is a good possibility that the lakes (Cocolalla and Round) are filtering a large quantity of the sediment load in the mid-section of the Cocolalla Creeks. Further investigation and sampling of various areas of the lower outlet reach would be valuable to gain a better understanding of ultimate sediment destination from upstream pollution. This would also provide information as to the extent of nonpoint source pollution in the watershed from Cocolalla Lake to the Pend Oreille River.

The 1991 results at the outlet stream indicate a need for further investigation into dissolved oxygen values at different points in the stream to determine if levels may be low consistently enough to impair cold water biota.

Even though there is considerable information available on the water quality of the watershed above the outlet stream, data on the lower watershed and Round Lake is limited. Upstream pollution treatments should improve the conditions downstream, although more in depth analysis of the lower watershed may turn up other subwatershed specific problems.

There is no information currently available on what particular values for sediment loads would be adequate to support beneficial uses in Cocolalla Creek. Because there was no Cumulative Watershed Effects analysis done on the Lower Cocolalla Creek there is inadequate data on what actions taken within the watershed will significantly reduce sediment loading.

4. Problem Assessment Conclusions

Lower Cocolalla Creek has been determined to be a water quality limited segment as determined by DEQ's waterbody assessment process. It was determined that the primary factors of concern are sediment and thermal modification. These pollutants are considered to be impairing cold water biota based upon available beneficial use reconnaissance data and other data. The impairment determination was based upon a low macroinvertebrate index score of 2.99 and temperatures exceeding 22°C. Warm water temperatures limit the survival of low temperature organisms and excess sediment limits their habitat diversity.

5. TMDL - Loading Analysis and Allocation

See attached spreadsheet.

Problem Statement:

Excess sediment is impairing the beneficial uses of cold water biota and salmonid spawning in Lower Cocolalla Creek.

5.a. Numeric Targets

(See attached spreadsheet)

5.b. Source Analysis
(see attached spreadsheet)

5.c. Linkage Analysis
(See below)

5.d. Allocations
(see attached spreadsheet)

5.c. and 5.e. Monitoring Plan and Linkage Analysis

Because Idaho's Water Quality Standard for sediment is narrative and not based upon something directly measurable in the water column, a different approach is required to achieve a satisfactory monitoring plan. An analysis of the methods available for monitoring the success of TMDLs indicates that, in this case, more than one method should be used to verify the cause of the impairment, track load reduction, and to show that the stream is moving towards full support. The sediment monitoring plan will include three parts:

1. Determination of support status using Beneficial Use Reconnaissance monitoring. If the conclusion of the survey is no impairment for two surveys taken within a five year time period then the stream can be considered restored to full support status.
2. Load reduction measures shall be tracked and quantified. For example, 1.2 miles of road obliteration near a stream, 0.5 miles of stream bank fenced, 5 acres of reforestation, etc.
3. Amount of sediment reduction achieved by implementation of load reduction measures shall be tracked on a yearly basis. For example, 1.2 miles of road obliteration will result in a 6 tons/yr reduction, 0.5 miles of stream bank fenced will result in a 3 ton/yr reduction, 5 acres of reforestation will result in a 0.7 ton/yr reduction, etc.

The reason for this three part approach is the following:

1. DEQ presently uses the Beneficial Use Reconnaissance data to indicate if the stream is biologically impaired. Often times this impairment is based upon only one Reconnaissance survey. The survey should be repeated to insure that the impairment conclusion is correct and repeated twice after implementation to determine if the (improved) support status conclusion is correct. Survey data may show an impairment in fisheries or macroinvertebrates and the cause of the impairment may point to sediment pollution. However, there is not a direct linkage between the pollutant and the impairment. Sediment could be indicated as the problem when, in fact, temperature might be the problem. The Reconnaissance data is not specific as to the cause, just that there is a problem.

So using the Reconnaissance data alone to monitor the TMDL is not adequate.

2. There is great uncertainty about how much sediment actually needs to be reduced before beneficial uses are restored. These TMDLs use a very conservative approach, in that the sediment target is limited to natural background amounts. However, beneficial uses may be fully supported at some point before this target is achieved. Therefore, a measure of sediment reduction cannot be used exclusively to determine a return to full support.
3. Because TMDLs are based upon target loads measured in a mass per unit time there must be a method included to directly measure load reductions. Coefficients, which estimate sedimentation rates over time based upon land use, have been used to develop the existing loads. This same method can be used for land where erosion has been reduced. Road erosion rates are based upon the Cumulative Watershed Effects road scores. These scores can be updated as road improvements are made and the corresponding load reduction calculated.

5.f. Margin of Safety

Because the measure of sediment entering a stream throughout the entire watershed is a difficult and inexact science, assigning an arbitrary margin of safety would just add more error to the analysis. Instead, all assumptions made in the model have been the most conservative available. In this way, a margin of error was built into each step of the analysis. Explanations of some of the values have not been detailed as yet on the spreadsheets pending their revision. Background loading from land uses and stream bank erosion coefficients are being revised to be specific to the Pend Oreille watershed. Once the revised values are received the "Sediment Yield" portion of the spreadsheet will more fully explain the source of the values. For an explanation of how the Cumulative Watershed Effects data was collected and processed, refer to the Idaho Department of Lands manual titled, "Forest Practices Cumulative Watershed Effects Process For Idaho". One important detail to note when looking at how the Cumulative Effects data was used in the TMDL is that, although all forest roads in the watershed were not assessed, the field crews are directed to assess the roads most likely to be contributing sediment to the stream. This weighted the average road scores towards the ones most likely to be in poor condition. Because Lower Cocolalla Creek was overlooked during data collection for this project, the Cumulative Effects data had to be estimated using other watersheds in the sub-basin with a similar geologic type.

References

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Lower Cocolalla Creek: Land Use Information

Land Use

Sub-watershedLower Cocolalla Ck

Pasture (ac)	10705
Forest Land (ac)	19864
Unstocked Forest (ac)	3974
Highway (ac)	10.9
Double Fires (ac)	0

Explanation/Comments

Includes once burned areas
State or County Paved Highways
Areas which have been burned over twice

Road Data

Sub-WatershedLower Cocolalla Ck

1. Forest roads (total miles)	115
#CWE road score (av)	20
*Sediment export coefficient (tons/mi/yr)	4.8
#Total Forest Rd Failures (cubic yds delivered)	76
2. Unpaved Co.& priv. roads (total miles)	68
**Sediment export coefficient (tons/mi/yr)	25.5
Paved Co.&priv. roads (total miles)	7.5
#Total C&P Rd Failures (cubic yds delivered)	44.9

##Stream bank erosion-both banks (mi)

poor condition	3.2
good condition	5.8

****erosion coefficients**

166.3 tons/yr/mi
51.7 tons/yr/mi

*McGreer et al. 1997

**Stevenson 1996. Recomends 7 tons/ac/yr for unsurfaced roads X 3.64 ac/mi road = 25.5 tons/yr/mi

#Presumed CWE score for roads and road failures derived from a weighted average of CWE scores by geologic type from watersheds assessed by CWE in the Pend Oreille watershed.

##Source of data from 1996 aerial photos.

Sed. Yield

Lower Cocolalla Creek: Sediment Yield

Sediment Yield From Land Use

Watershed:	<u>Lower Cocolalla Ck</u>
Pasture (tons/yr)	588.8
Forest Land (tons/yr)	754.8
Unstocked Forest (tons/yr)	67.6
Highway (tons/yr)	4
Double Fires (tons/yr)	0
Total Yield (tons/yr)	1415.2

Explanation/Comments

Acres by Land Use X Sediment Yield Coefficient = Tons Sediment/yr

Yield Coeff. (tons/ac/yr)

0.055

0.038

0.017 *(this acreage is a subset of Forest Land acreage)*

0.034

0.017 *(this acreage is a subset of Forest Land acreage)*

(Values taken from WATSED and RUSLE models see below explanation [#])

*Sediment Yield From Roads

Watershed:	<u>Lower Cocolalla Ck</u>
Forest Roads (tons/yr)	552.0
Forest Road Failure (tons/yr)	95.8
County and Private Roads (tons/yr)	1734
Co. and Private Road Failure (tons/yr)	56.6

Miles Forest Rd X Sediment Yield Coeff. from McGreer Model

***Assumes soil density of 1.5 g/cc and a conversion factor of 1.26.*

*Percent fines and percent cobble of the Bonner-Kootenai and Pend Oreille-Treble series B&C soil horizons is 80% fines, 20% cobble (Bonner Co. Soil Survey).

***"Guide For Interpreting Engineering Uses of Soils" USDA, Soil Conservation Service. Nov. 1971.

#Land use sediment yield coefficients sources: Pasture (0.055) obtained from RUSLE with the following inputs: Erosivity based on precipitation; soil erodibility based on soils in the watershed; average slope length and steepness by watershed; plant cover of a 10 yr pasture/hay rotation with intense harvesting and grazing; and no support practices in place to minimize erosion.

Forest Land (0.038) obtained from WATSED with the following inputs: landtype and watershed size

Unstocked Forest (0.017) obtained from WATSED with the following inputs: Acreage of openings, landtype and years since harvest.

Highways (0.34) obtained from WATSED with the following inputs: Value obtained from the Coeur d'Alene Basin calculations.

Double Fires (0.017) obtained from WATSED with the following inputs: Acreage, years since fire and landtype.

Lower Cocolalla Creek Watershed: Sediment Exported To Stream

	<u>Lower Cocolalla Ck Watershed</u>
Land use export (tons/yr)	1415.2
Road export (tons/yr)	2286.0
Road failure (tons/yr)	152.4
Bank export (tons/yr)	
poor condition	532.2
good condition	299.9
Total export (tons/yr)	4685.7
*Natural Background Mass Failure (tons/yr)	23.9

*Background mass failure is the difference between the total mass failure observed in the watershed, and the mass failure contributed by roads.

Target Load

Lower Cocolalla Creek Watershed

	<u>Acres</u>	<u>Yield Coefficient (tons/ac/yr)</u>	<u>Background Load (tons/yr)</u>
Total Watershed	30,569		
Presently Forested	19,864		
Estimated Historically Forested	29,569	0.038	1123.6
Estimated Historically Pasture	1,000	0.055	55
*Natural Mass Failure (tons/yr)			23.9
Background Load = Target Load			
		Target Load	1202.5
		Existing Load	4685.7
		Load Reduction	3483.2